BiOWiSH™ TECHNOLOGIES

Case Study

BiOWiSH™ Crop

Field Crops
Jilin Agricultural University, China

Background

Changchun Dacheng Group Co., Ltd. tested BiOWiSH™ Crop in early spring at Jilin Agricultural University's experimental field in Changchun City, Jilin Province and the test continued for several months.

Researchers studied the effectiveness of adding BiOWiSH™ Crop to standard farming practices in the region. Under a variety of conditions, BiOWiSH™ Crop improved broad-acre maize and rice crops. The maize plants treated with BiOWiSH™ Crop had higher yields, higher grain kernel weights, resulting in an increased yield. In the rice tests, growers also experienced yield increases of more than eight percent. BiOWiSH™ Crop also improved the number of rice grains per spike and the seed rate.

Rice plants treated with BiOWiSH™ were ready for transplant earlier than plants in the control group.

Researchers determined an application rate of 200g/1000m^2 yielded the best results.

BiOWiSH™ Crop

- Improves yields
- Improves plant vigor
- Increases total number of crops per annum
- Increases nutrient availability to plants
- Stimulates microbial activity in the soil
- Accelerates crop residue decomposition

Available Sizes

- 3.5oz
- 2.2lb
- 11lb

Objectives

Increasing crop production is a major concern in China, which is struggling to meet demand and driving up import prices around the world. China's Premier recently visited one of the country's biggest farming areas and said that more effort needed to be made to increase technology, enhance management and establish plans to prevent natural disasters from harming crops[1]. China is also dedicated to achieving self-sufficiency, requiring farmers to meet increased demand with limited resources, including the amount of land available for farming.

Solution

BiOWiSH™ Crop was chosen for the trial. Because BiOWiSH™ Crop increases yields, it can help nations, such as China, increase production and achieve self-sufficiency without dedicating additional land to farming. BiOWiSH™ Crop is an organic based commercial fertilizer that helps increase micronutrient uptake in plants, improves plant vigor and

stimulates microbial activity in the soil.

Results

Test 1: Maize

BiOWiSH™ Crop was examined to determine its effect on maize crops. There were two control treatments – one with crushed straw and one without – and a BiOWiSH™ treatment. Each treatment consisted of three randomized replicates. For the BiOWiSH™ group, BiOWiSH™ Crop was applied at 200g/1000m2 to crushed straw which was then applied to the ground. The BiOWiSH™ plots had an increase in grain yield of up to 9.4%.

Effect of BiOWiSH™ Crop on Corn Grain Yield

	Grain Yield/kg hm^2	Compared with CK1/%	Compared with CK2/%
CK1: stubble field	12312.8	100.0	98.6
CK2: straw field	12491.1	101.4	100.0
D2: straw field + BiOWiSH™ 200g/1000m^2	13469.5	109.4	107.8

The BiOWiSH™ Crop treatment also had increases in corn grain kernel weight and grain weight per spike of up to 6.27% and 9.29%, respectively.

Effect of BiOWiSH™ Crop on Corn Ear Traits

	Grain Kernel Weight/g	Grain Weight Spike/g
CK1: stubble field	40.05	235.7
CK2: straw field	40.32	237.3
D2: straw field + BiOWiSH™ 200g/1000m^2	42.56	257.6

Treating plots with BiOWiSH™ Crop also reduced the volume of root triphenyl tetrazolium chloride (TTC), an important indicator of metabolic activity, root morphological and physiological characteristics. TTC reduction volume reflects the ability of roots to absorb water, nutrients, and reflect condition of root activity. A larger reduction volume of TTC indicates an overall healthier plant. This study found BiOWiSH™ Crop was effective at reducing TTC. In the plots treated with BiOWiSH™ Crop, the Root TTC reduction volume was up to 11.85% higher than in the control plots.

BiOWiSH™ Reduction of TTC Levels Compared to Control Treatments

	After 13 Weeks	After 16 Weeks
CK1	+9.61%	+11.85%
CK2	+7.45%	+9.64%

The study concluded that BiOWiSH™ Crop improves maize plants, potentially providing significant economic benefits for growers. The BiOWiSH™ plots had yield increases of nearly eight-percent over the control plots resulting in additional income for growers.

BiOWiSH™ Maize Treatment

Yield Increase Over Control (%)	Productivity Increase (kg/ha)
7.8%	978

Test 2: Rice

The testing determined BiOWiSH™ used for rice straw decomposition had an obvious effect on seed emergence. Farmers in the area typically leave left over straw from the previous harvest on the field even though it can negatively impact future crops. Because BiOWiSH™ helps accelerate the decomposition of the straw, it allowed the rice plants to be ready for transplant earlier than plants grown without BiOWiSH™. Rice seeds were soaked in early spring and sowed 10 days later. After 43 days, the rice seedlings were transplanted. Seeds treated with BiOWiSH™ Crop were more likely to be ready for transplant on day 43.

Effect of BiOWiSH™ Crop on Rice			
	Seeding to Emergence kg/hm^2	Increase Over CK1	Increase Over CK2
CK1: stubble field	8026.9	n/a	n/a
CK2: straw field	8539.9	n/a	n/a
S2: straw field + BiOWiSH™ 200g/1000m^2	9231.6	15.0%	8.1%

Using BiOWiSH™ Crop also increased rice grains per spike, seed rate and grain yield by as much as 8.1%. These increases again offer growers the ability to increase profits with the addition of BiOWiSH™ Crop to their current management program.

Effect of BiOWiSH™ Crop on Rice					
Holes/hole*m^2	Good grains/ Seed Grain[1]	Seed/Seed Grain[1]	Bad grains/Seed Grain[1]	Seed Rate%	Thousand Seed Weight/g
20	426	78	15	83.9	23.8
20	430	81	13	86.2	23.9
20	437	88	9	90.7	24.2

BiOWiSH™ Rice Treatment	
Yield Increase Over Control (%)	Productivity Increase (kg/ha)
8.1%	692

Conclusion

BiOWiSH™ Crop is an effective addititive top both maize and rice crops, offering yield increases of about eight percent in both trials. It was also determined that the extra cost of implementing BiOWiSH™ is offset by the increase in profits they experience.

Because BiOWiSH™ Crop improves yields, it also has the potential to help China and other nations increase their food production to meet the growing global demand.

Glossary of Terms

Please refer to Appendix 1.

[1] http://www.thecropsite.com/news/10570/premier-wen-inspects-agriculture-in-china

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Appendix 1 - Glossary of Terms

Control - in experimental designs, a control group is the "untreated" group with which an experimental group (or treatment group) is contrasted. It consists of units of study that did not receive the treatment whose effect is under investigation.

CK1- the first control treatment in the study.

CK2 - the second control treatment in the study that used/applied crushed straw on the field.

D2 - the BiOWiSH™ treatment applied at 200g/1000m2 to crushed straw which was then applied to the ground.

Crushed straw – crop residue used as an organic matter and nutrient source.

Replicate - a term referring to the repetition of a treatment to determine if the basic findings of the original study can be generalized to other participants.

Yield - a measurement of the amount of a crop that was harvested per unit of land area. Crop yield is normally measured in tons per unit area (acre, hectare).

Maize –more widely known as corn, a tall annual cereal grass bearing kernels on large ears. The leafy stalk produces ears which contain the grain, which are seeds called kernels.

Grain - a unit of measurement of mass that is nominally based upon the mass of a single seed of a cereal. Grains are small, hard, dry seeds harvested for human food or animal feed.

Panicle - the panicle is part of the rice plant that develops into grains, therefore more panicles translates into more rice being grown.

Paddy –a field where rice is grown.

NPK - stands for nitrogen, phosphate and potash, the three nutrients that compose complete fertilizers. You'll encounter NPK when reading the contents printed on bags of fertilizer. For example, if the bag says 20-10-5, that means 20% nitrogen, 10% phosphate and 5% potash.

Standard farming practices – the combination of standard fertilizers and other crop management techniques used by the farmer, including irrigation, pesticides, fungicides, etc.

Spike – the part of the rice plant where the seeds or grains of rice are found.

Seed rate - the number of seeds planted per unit measure to ensure normal density of sprouts and a maximum yield. The seeding rate is expressed by the number of germinating seeds and the weight of the seeds.

Corn ear - corn kernels develop along a cob and form an "ear" of corn. The ear is surrounded by protective leaves called a husk.

TTC or triphenyl tetrazolium chloride - an important indicator of metabolic activity, root morphological and physiological characteristics. TTC reduction volume reflects the ability of roots to absorb water, nutrients, and reflect condition of root activity. A larger reduction volume of TTC indicates an overall healthier plant.

Transplant – in agriculture, transplanting or replanting is the technique of moving a plant from one location to another. Most often this takes the form of starting a plant from seed in optimal conditions, such as in a greenhouse or protected nursery bed, then replanting it in another, usually outdoor fields.

Seeding – to sow (a particular kind of seed) on or in the ground.

Emergence – is the process by which plants emerge from seeds and begin growth as a prickle, through the soil surface.